B.Sc. (NEP) SEMESTER-II
(THEORY)

Programme: Certificate In Chemistry	**Year: I**	**Semester-II**
Course Code: CHE(N)-102		
Course Name: Fundamental Chemistry- II		
Credit: 3		
Max. Marks: 70+30 =100		

Course Objective and Outcomes:

Upon successful completion of this course, the learners will be able to describe the reactions shown by aliphatic and aromatic compounds. They will also able to understand the bonding in inorganic molecules, salient features of s- and p- block elements, different aspects of chemical kinetics, colloidal solution, thermodynamics and equilibrium.

Syllabus Details

Block-1: Chemical bonding and periodic elecments

Unit 1: Chemical bonding –III

Ionic solid- Ionic characters, radius ratio effect and coordination number, limitations of radius ratio rule, lattice defect, semiconductors lattice energy and Born-Haber cycle, Fajan's rule. Weak intrections- hydrogen bonding, van der Waal forces**.**

Unit 2: s- block elements

Alkali metals: General introduction, general characteristics and use (Flame Colouration), Oxides and Hydroxides, solubility and hydration. Complexation of alkali metal ions. Anomalous Behavior of Lithium.

Alkaline earth metals: General introduction, general characteristics and uses, Halides and Hydrides of Beryllium, complexation behavior. Anomalous Behavior of Beryllium.

Unit 3: p- block elements

Introduction, general characteristics and uses. Chemistry of hydrides, halides, oxides and oxyacids of p-block elements. Silicates, Boron nitrogen compounds (borazene and boron nitrides), interhalogen compounds

General introduction, general characteristics and uses. Compounds of Noble gases-Preparation, Properties and structures.

Block-2: Aromatic hydrocarbon and hydrocarbon derivatives

Unit 4: Arenes and Aromaticity

Nomenclatures of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Resonance and MO picture

Aromaticity: the Huckel's rule, aromatic ions.

Unit 5: Reaction mechanism of aromatic hydrocarbon

Aromatic electrophilic substitution- general pattern of mechanism, role of σ and π complexes. Mechanism of nitration, halogenations, sulphonation, Friedel Craft reactions. Activating and deactivating substituents, orientation and ortho/para ratio. Reduction of benzene (Birch reduction).

Unit 6: Alkyl Halides

Nomenclature and classification of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides, SN1 and SN2 and SNI reaction with energy profile diagrams. Elimination reactions, types of elimination reactions. Polyhalogen compounds-Chloroform, carbon tetra chloride.

Unit 7: Aryl Halides

Nomenclature and classification of aryl halides. Methods of formation of aryl halides, nuclear and side chain reaction. Chemical reactions. Relative reactivity of alkyl halides vs allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC.

Block-3: Chemical kinetics and Thermodynamics

Unit 8: Chemical Kinetics

Chemical kinetics and its scope, rate of reaction, factors affecting the rate of reaction-concentration. Pressure, temperature, solvent, light, catalyst. Order of reactions, zero order, first order, second order, third order and pseudo order. Integrated rate law equation of zero and first order of reaction. Half life periods. Radioactive decay as a first order phenomenon, Concept of activation energy.

Unit 9: Colloidal State

Definitation of colloids, classification of colloids. Solid in liquid (sols): properties-kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquid in liquid (emulsion): types of emulsion, preparation. Emulsifire.

Unit 10: Thermodynamics I

Introduction, Definition of thermodynamics terms, System surrounds, Types of systems Intensive and extensive properties, States and path functions and their differentials, Thermodynamic, process, Concept of heat and work, First law of thermodynemics, Internal energy and enthalpy, Heat capacity, Heat capacity at constant volume and pressure, Jule Thomson effect, Jule Thomson coefficient, Calculation of w, q. dU and dH for the expansion of ideal gases.

Block-4: Equilibrium

Unit 11: Chemical equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle. Reaction isotherm and reaction isochore- Clapeyron equation and Clapeyron Clapeyron-equation, applications

Unit12: Ionic equilibrium

Introduction, Electrolytes and Non-electrolytes: Aciss, Bases and Salts, ionic product of water, Common Ion Effect, Ionic Equilibria in weak Acids and Bases including Multistage Equilibria. pH Scale Exact treatment of Calculation of H^+ ions andc pH for HA and BOH. Hydrolysis- Salt hydrolysis, hydrolysis constant, pH calculation, Degree of hydrolysis, Titrations Acid- Base Titration Curve. Buffer solution, Buffer capacity, Handersion equation, Solubility and solubility product. Indicators. Common ion effect and the Solubility of a Sparingly soluble salt

B.Sc. (NEP) SEMESTER-II
(LABORATORY WORK/PRACTICAL)

Programme: Certificate In Chemistry	**Year: I**	**Semester-II**
Course Code: CHE(N)-102L		
Course Name: Laboratory Course-II		
Credit: 1		
Max. Marks: 50		

Course Objective and Outcomes:

After completing this course, the learners will be able to quantitatively find out the amount of acid or base in the samples, to qualitatively differentiate among different classes of organic compounds and to measure the relative viscosity of a given liquid.

Block-1: Laboratory hazards and safety

Unit 1: Laboratory hazards and safety precautions

Laboratory hazards and safety precautions

Block-2: Experiment

Unit 2: Inorganic exercise: Acid base titration

Acid-base titrations; preparation of a solution in normal/molar terms, its standardization using a primary standard solution, determination of the strength of unknown solution. For example: preparation of NaOH solution (secondary standard say N/10), preparation of $(COOH)_2$ solution (primary standard say N/10), standardization of NaOH solution titrating it against $(COOH)_2$ solution using phenolphthalein (indicator) and then determination of the strength of given HCl solution.

Unit 3: Organic exercise: Chemical, physical and functional group tests

Differentiation between aliphatic and aromatic compounds using chemical and physical tests. Identify the functional group present in the organic compounds.

Unit 4: Physical exercise: Determination of relative viscosity

Determination of relative viscosity of the given liquid using Ostwald viscometer.

Distribution of marks shall be as given below:

1.	Inorganic exercise	:	12
2.	Organic exercise	:	12
3.	Physical excercise	:	11
4.	Viva	:	05
5.	Home assignment/internal assessment, lab record and attendance	:	10